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Scarlet Fever

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In the Symposium on Scarlet Fever held in the Section of Preventive Medicine and Hygiene of the Academy of Medicine, Toronto, on November 27th, 1924, the following papers were read.

Dr. J. G. Fitzgerald, Professor of Hygiene and Preventive Medicine and Director of the Connaught Laboratories, University of Toronto, who gave the paper prepared by the late Dr. W. Ray Hodge, paid the following tribute to Dr. Hodge prior to reading his paper:

"Since this programme was arranged we, his friends and colleagues, have sustained a tragic loss in the death of Dr. Ray Hodge on November first, 1924.

"He was one of the outstanding younger men in the medical profession in this Dominion. He stood just on the threshold of a career full of promise of high achievement. Dr. Hodge had already made substantial contributions to scientific medicine, and up to within a few days of his death was engrossed in problems in the new fields opened up through the splendid researches of the Dicks.

"Dr. Ray Hodge was a thorough and diligent scientific worker, an able and most promising young clinician and a man loved by those of us who knew him well. He has left us a radiant memory which we will always deeply cherish."

Epidemiology and Immunology

W. RAY HODGE, B.A., M.D., TOR.*

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A SURVEY of the Dick researches which have established the etiology of scarlet fever, convinces one that far-reaching results epidemiologically and immunologically may be obtained by a proper application of this recently acquired knowledge. The Dicks (1)

have produced experimental scarlet fever in humans with the scarlet fever hemolytic streptococcus; they have also demonstrated the fact that this streptococcus produces a toxin which is found in the filtrate of media in which this organism is grown, this toxin injected intracutaneously in suitable dilutions in humans produces an inflammatory reaction in the skins of those susceptible to scarlet fever. In larger amounts the toxin may be used to produce active immunity in humans and in massive doses in horses to produce an anti-toxin for therapeutic use.

The skin test for susceptibility to scarlet fever is called (2) the Dick test. It is assumed that persons susceptible to scarlet fever will give a positive Dick test, and that those insusceptible will give a negative Dick test. The evidence accumulating from the performance of Dick tests in large numbers of people supports these assumptions, the six instances in which the Dicks had an opportunity to observe the skin test before and after an attack of scarlet fever it was positive before the attack and negative during convalescence. Zingher (3) mentions the case of two patients who were admitted to the scarlet fever wards in the Willard Parker Hospital with the diagnosis of scarlet fever; neither had scarlet fever because both developed scarlet fever five days after admission. On admission both gave maximal reactions to scarlet fever toxin.

Dick and Dick found in a series of sixty-three (4) persons with negative skin tests that none of these persons developed scarlet fever when exposed to the disease. Among thirty-two persons exposed to scarlet fever, on whom the skin test was not done, and in two with positive skin tests who were exposed to scarlet fever before their immunization was completed, seven contracted scarlet fever, the two positive reactors were amongst the seven. Dick and Dick (5) were also unable to produce experimental scarlet fever in a person with a negative skin test, while a person with a positive skin test developed experimental scarlet fever. Perhaps the most convincing testimony of the accuracy of the Dick test in determining susceptibility to scarlet fever, is to be found in the record of tests done on scarlet fever patients in the early stages of the disease and during convalescence. Zingher (6) tested 141 cases of scarlet fever within the first five days of the onset of the illness and found that 100% gave a positive Dick test with a standard toxin dilution. Zingher also tested one hundred and seventy cases of scarlet fever during convalescence and found that one hundred and eight or ninety-three per

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NOTE.—This paper was completed a few days prior to Dr. Hodge's Death on November 1st, 1924.

cent. gave a negative reaction. The explanation of the persistence of the Dick test in seven per cent. of scarlet fever convalescents is not clear. It is possible that there is more than one toxin responsible for the production of this disease, it is also possible that diagnostic error may account for an occasional case but this could scarcely hold for the whole seven per cent. Finally it seems quite probable that these cases may be poor anti-toxin producers so that although sufficient anti-toxin may have been produced to combat the toxemia of the disease there is no superfluous anti-toxin in the blood or tissues. It would be of great interest to determine if these patients can be actively immunized with scarlet fever toxin so that the skin test becomes negative. The history of a preceding attack of scarlet fever therefore leads one to expect a negative skin test with the standard dilution of the Dick toxin but the contrary is not true. Patients giving no history of scarlet fever do not all give a positive Dick reaction. There are probably two main causes for this discrepancy; the first is that a certain proportion of this group have had scarlet fever which has been undiagnosed; the second explanation is that the remaining members of the group have been infected with a scarlet fever streptococcus but have not developed the florid type of the disease, perhaps a sore throat, moderate malaise and a rash so transient or slight that it is altogether missed, have characterized the picture, in this group, such a larval type of infection would be ignored by the socially less favoured persons in any community and conditions for the dissemination of such an infection would be optimal among them. It is precisely in such a group that a negative history of scarlet fever is of practically no value. Perhaps the best illustration of this situation is to be found in the attempt of the Dicks in 1921 (7) to produce experimental scarlet fever with the hemolytic streptococcus, isolated from scarlet fever cases. Thirty volunteers were swabbed with cultures freshly isolated from the throats of scarlet fever patients but in no instance was experimental scarlet fever produced. These volunteers were obtained from the lower social strata in Chicago and all gave a negative history of scarlet fever. When, however, the Dicks chose volunteers of an intelligent type whose full personal and family history could be obtained and whose childhood had been spent either in rural districts or in well-to-do homes, they were able to produce experimental scarlet fever. With the development of the Dick test the choice of volunteers for the production of experimental scarlet fever was simplified. The Dicks were then able to show that a volunteer with a positive skin test developed experimental scarlet fever (8) while the volunteer with a negative skin test and swabbed with the same culture, remained well. No more convincing proof could be advanced for the reliability of the skin test in the determination of susceptibility to scarlet

fever. The conclusion we seem to be arriving at is that patients with a negative Dick test have had either unrecognized clinical scarlet fever or a larval infection. The percentage of positive Dick tests obtained in new-born infants is small, about 10 or 15%, and it is claimed by Zingher that (9) a placental immunity has been demonstrated. The percentage of positives then rises so that in the 2nd and 3rd years 70% of cases give a positive skin test, this is the peak. In succeeding years the number of positives falls so that in those over 20 years of age only 18% give a positive reaction. The inference to be drawn from these tests is that in the second and third years of life the susceptibility to scarlet fever is greatest and that probably all children, if tested at the right time, would show a positive Dick test. Hence the placental immunity is soon lost and our acquired immunity is an active one obtained through infection with the *S. scarlatinae*, the cause of the disease. Dochez working independently had arrived at the same conclusion but his work was less convincing as he was unable to demonstrate the presence of scarlet fever toxin in filtrates from media in which his organisms were grown; he does not state what methods were used to demonstrate the presence of this toxin but it is likely that laboratory animals were used for this purpose. If this is so the explanation is clear because the only animal which is uniformly susceptible to the action of the toxin and which responds to injection with the formation of anti-toxin is the horse. Dr. Dochez was kind enough to give us one of the strains of hemolytic streptococcus with which he worked and we find that this organism does produce toxin and that filtrates of media in which this organism is grown give a positive skin test in susceptible humans.

The organisms which we have been using for routine toxin production in the Connaught Laboratories are the two Dick strains which have produced experimental scarlet fever in humans. Culturally and morphologically these organisms are indistinguishable from hemolytic streptococci from varying sources. One of those strains ferments mannite, the other does not. The essential characteristic which places these organisms in the scarlet fever group is that they are toxin producers. Toxin production occurs in both solid and fluid media. The solid medium used is sheep or horse blood agar, broth is added to the melted agar in order to ensure a large amount of condensation fluid. After four to seven days growth the condensation fluid is poured off and filtered, the filtrate contains the toxin in fairly high concentration. The fluid medium used for routine toxin production is plain broth of PH 7.4. to 7.6. It contains ten per cent. horse or sheep's blood. The toxin produced in this medium varies from 1/2 to 1/10 the concentration of that produced on blood agar. We are finding that toxin production occurs equally as well in buffered

broth and in hormone broth and that the enriching media used have little effect on the toxin production—glucose or ascitic fluid producing toxins of comparable strength to those produced when blood is used as an enriching medium. Within the limits of growth the reaction of the medium has but slight effect on toxin production. Toxin produced in broth of reaction PH 7.0 comparing favourably with that produced in broth of reaction PH 7.5. It appears therefore that toxin production is a singularly constant phenomenon.

The toxin is relatively thermostabile and is only destroyed if it is heated at 90° C. for at least one hour. (This is very different from diphtheria toxin which is rendered inert in ten minutes at 75° C.). The addition of 0.5% phenol to the toxin does not influence its ability to produce positive skin tests in susceptibles but evidence is accumulating to show that it does impair the immunizing power of the toxin. Toxin produced by growth of the organism on blood agar is quite concentrated and is capable of producing positive skin tests in susceptibles in dilutions as high as 1:100,000. For routine skin tests this toxin is used in a 1:1000 or 1:2000 dilution. No animal has been found which gives positive skin tests with such high dilutions of toxin. The rabbit reacts uncertainly to 1:100 dilutions, the dog fairly regularly to 1:100 dilutions, furthermore it is not possible to kill rabbits or guinea pigs with massive doses of toxin and attempts to produce anti-toxin in these animals by injections of toxin have not been successful. Subcutaneous injections of toxin in horses result in local inflammation and fever and after repeated injections anti-toxin can be demonstrated in the blood. As the Dick test is considered to be a reliable index of immunity and susceptibility to scarlet fever its applications are widespread, its most important application leading to the control of scarlet fever positive reactors being segregated and either actively immunized by three doses of toxin or passively immunized with anti-toxin. The test is also of value in the diagnosis of doubtful cases of scarlet fever in that a definitely negative reaction during the first two days is against the diagnosis of scarlet fever. In a series of fourteen scarlet fever cases tested by Zingher (10) a positive reaction occurred in each during the early stages of the disease. Of 170 cases tested during convalescence 158 gave a negative Dick reaction. Our results with the Dick test in Toronto are quite comparable to those of Zingher but the series of cases tested is much smaller, at the present time our opinion from a limited experience is that this test is all it is claimed to be and that it is of great importance epidemiologically.

By no means the least fascinating aspect of the Dick researches is the development of a scarlet fever anti-toxin. It seems singularly fortuitous that the only animal which regularly responds to this injection

of anti-toxin production is the horse. The method of immunization adopted is to give horses gradually increasing doses of filtrate from blood broth in which the organisms are grown. The filtrate is given at weekly intervals the initial dose being 25 c.c. and the dose is doubled each time until one litre is given when there is no further increase. All injections are given subcutaneously, the horses respond to injection with local swelling and inflammation and fever. A three months' course of immunization at least is usually required to produce sera of satisfactory potency. A serum of such potency that 1/10 c.c. will completely neutralize the skin doses of toxin is considered strong enough for concentration. The method of concentration of the anti-toxin is that used for concentrating diphtheria anti-toxin. The final product is purely anti-toxic and not bactericidal. Anti-toxin may also be produced by the method of Dochez which has already been outlined. In our hands this method has up to the present proved less satisfactory, the serum has not had marked anti-toxic properties and the horses developed troublesome abscesses. It is, however, possible that in the Dochez serum we may get a combination of anti-toxin and bacterial anti-bodies and if such a serum could be obtained with good concentration of both types of anti-bodies it would be highly desirable. The reason for this is obvious and has already been mentioned in the introductory paragraph, *i.e.*, that scarlet fever is a combined toxic and bacterial infection in which the greatest complications are due to bacterial invasion. It is hardly to be hoped that the anti-toxin alone will directly prevent bacterial invasion but of course it may do this indirectly by neutralizing the effect of the toxin on the tissues.

REFERENCES.

1. Dicks, G. F. and Gladys H. J.A.M.A. (Oct. 6) 1923, p. 1166.
2. Dicks, G. F. and Gladys H. J.A.M.A. (Jan. 26) 1924, p. 265.
3. Zingher, A. J.A.M.A. (Aug. 9) 1924, p. 432.
4. Dicks, G. F. and Gladys H. J.A.M.A. (July 12) 1924. Vol. 83, p. 84.
5. Dicks, G. F. and Gladys H. J.A.M.A. (Jan. 26) 1924, p. 301.
6. Zingher, A. J.A.M.A. (Aug. 9) 1924. Vol. 83, p. 432.
7. Dicks, G. F. and Gladys H. J.A.M.A. (Sept. 3) 1921. Vol. 77, p. 782.
8. Dicks, G. F. and Gladys H. J.A.M.A. (Jan. 26) 1924. Vol. 82, p. 301.
9. Zingher, A. J.A.M.A. (Aug. 9) 1924. Vol. 83, p. 432.
10. Zingher, A. J.A.M.A. (Aug. 9) 1924. Vol. 83, p. 432.

The Dick Test

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THE Dick Test, so called in recognition of the original work carried on by G. F. and G. H. Dick of Chicago, is used to determine the susceptibility or immunity of a person to scarlet fever.

In 1916 Dick and Dick (1) described the reaction occurring in convalescent scarlet fever patients on intra-cutaneous injection of killed streptococci. These reactions compared with similar tests on persons who had not had scarlet fever showed nothing specific. This work was really the first attempt to demonstrate immunity or susceptibility to scarlet fever by means of a skin test. Nothing further was done until experimental scarlet fever had been produced by a strain of haemolytic streptococcus in 1923 by Dick and Dick. The filtrate of the same culture which had produced experimental scarlet fever was then used in an effort to produce skin reactions. Injection of this filtrate was followed by inflammatory reactions, more frequently in persons who gave no history of scarlet fever than those convalescing from scarlet fever.

Technique of Test:

Certain recommendations have been made by Dick and Dick (2), Branch and Edwards (3), Abraham Zingher (4, 5, 6, 7), who have carried on a large series of tests.

1/10 c.c. of 1-1000 dilution of the soluble toxic filtrate obtained from a culture of the specific haemolytic streptococcus is injected intra-cutaneously on the anterior surface of the forearm. Using a standard tuberculin or 1 c.c. Leur syringe with a No. 26 gauge $\frac{1}{4}$ "- $\frac{1}{2}$ " steel needle. The right arm is usually selected for the test injection.

Control Test:

Consists of intra-cutaneous injection of 1/10 c.c. of 1-1000 dilution of the same soluble toxic filtrate which has been boiled previously for one hour. The site for the control test is usually on the anterior surface of the left forearm. Boiling the filtrate for one hour completely inactivates the toxin.

In case the test and control are done on the same arm they should never be closer than 7 cm. to each other.

The original dilution of the toxin was 1-1000, but this may be varied depending on the strength of the toxic filtrate.

Interpretation of the Reactions:

Four types of reaction are recognized with the Dick test and control test, which correspond closely to the similar four reactions with the Shick test, namely:

(1) Negative reaction, (2) positive reaction, (3) negative-pseudo reaction, (4) positive combined reaction.

(a) *Negative reaction*.—Shows no change at the site of the test or control. A faint pink streak may occasionally be seen which follows the course taken by the needle.

(b) *Positive reaction*.—Usually begins to appear from 4-6 hours after the inoculation. At first they consist of a small circular area of erythema. This red area increases and reaches a maximum size and intensity in 18-36 hours. In less strongly positive reactions the maximum is reached in 18-24 hours. The reddening is frequently associated with some degree of swelling of the skin. In the most strongly positive tests the reddened area continues to spread and swelling increases up to about 36 hours. Soon after reaching their maximum size and intensity the reactions begin to subside. Even the most strongly positive do not persist after 48 hours. The bright red colour becomes dull and begins to fade. The swelling disappears, leaving only a yellowish pigmented area. The area occasionally shows slight desquamation during 7-10 days following the test. The pigmentation, however, is more constant than the desquamation.

The reactions are observed about 12-16 hours after the injection and are further classified according to size and intensity.

(1) *Slightly positive*.—Consisting of a faint red area less than 2 cms. in diameter, without swelling or tenderness of the skin.

(2) *Positive*.—Measuring 1.5-3.0 cms. in diameter bright red in colour, with some swelling of the skin and occasionally slight tenderness.

(3) *Strongly positive*.—More than 3 cms. in one or both diameters, intensely red, with marked swelling and induration of the skin, with some tenderness. The swelling usually shows a sharply raised edge and extends beyond the reddened area.

(c) *Negative-Pseudo reactors*.—Show an area of redness, with or without induration, which is similar in size and appearance at the site of the test and the control. This pseudo reaction fades more rapidly than the positive reaction but always equally on both forearms. The suggestion made to explain the occurrence of the negative-pseudo reaction is that it may be due to a hypersensitiveness to the autolyzed protein of the haemolytic streptococcus.

(d) *Positive-Combined reaction*.—Appears more intensely on the test area. The control shows a lesser degree of redness.

In the series of tests done by Zingher and by Dick they have satisfactorily shown that positive and positive-combined reactors are susceptible to scarlet fever, while negative and negative-pseudo reactors are immune to the disease. In their series none of the negative or negative-pseudo reactors developed scarlet fever, while seven positive and positive-combined reactors did develop typical attacks of scarlet fever. In all seven cases negative Dick reactions were obtained during convalescence. The blood sera of positive and negative reactors have been tested by them for their antitoxic properties. Positive reactors gave negative antitoxic tests, while negative reactors gave positive tests with a moderate variation in quantity.

Results Obtained with the Dick Test in Normal Persons:

The test has been applied to individuals in the following groups, and reactions observed to note the effect of age grouping and social status of the person.

- (1) Mother and young infants.
- (2) Children of pre-school age.
- (3) Children of school age.
- (4) Adults.
- (5) Selected groups of adults.

The tests have been done on patients in the Burnside Hospital, Sick Children's Hospital, Toronto General Hospital and Isolation Hospital.

1. Mothers and Young Infants:

All infants were under one month of age and varied from 1 day to 26 days.

(a) Mother—Positive.....	8
(b) Baby—Positive.....	8
(a) Mother—Negative.....	24
(b) Baby—Negative.....	24
(a) Mother—Positive.....	6
(b) Baby—Negative.....	6
(a) Mother—Negative.....	6
(b) Baby—Positive.....	6

We have attempted to show the similarity in the scarlatinal antitoxic immunity of mother and child. Apparently there is transmission of antitoxic antibodies from mother to child through the placental circulation. The positive reactions in infants are, as a rule, much smaller

and less intense than in older children. The suggestion has been advanced that the smaller reactions may be due to the limited ability of the skin of young infants to respond to inflammatory stimuli.

Inherited immunity in infancy is retained up to the 5th or 6th month of life, gradually disappearing after this period. In some few cases the immunity persists for a longer period even to one year of age.

2. Age Groups:

Age	Total Tested	Dick Positive	Dick Negative	Dick Positive %
0-6 months.	105	32	73	30.5%
6-12 "	51	13	38	25.5%
1-2 years...	15	7	8	46.7%
2-3 " ..	6	3	3	50.0%
3-4 " ..	11	6	5	54.5%
4-5 " ..	9	4	5	44.4%
5-10 " ..	51	22	29	43.1%
10-15 " ..	31	17	14	54.8%
15-20 " ..	17	11	6	65.3%
20 years up..	324	100	224	30.9%

From the above table it can be seen that there are two periods of life showing a high percentage susceptibility to scarlet fever: (1) 2-4 years, (2) 10-20 years.

3. In a series of 68 cases, who gave a definite history of having had scarlet fever, we obtained 68 negative tests, thus showing an immunity following an acute attack of scarlet fever.

4. Effect of Social Status on Test:

Results are from a selected group, composed of medical students from whom a reliable history could be obtained. Their ages ranged from 20-26 years. In all 42 students were tested, giving 40% positive reactors.

We have observed certain possible errors in technique and also in interpretation of the Dick test in the small series shown above. Conclusions, which are to be of any value, must be drawn from a series of tests in which errors in technique have been minimized as far as possible. The following are a few suggestions which have been adopted, and although some may seem to be of minor importance they will cause considerable inaccuracy and difficulty in interpretation of the findings if not observed.

- (1) Accurate injection of 0.1 c.c. of 1-1000 dilution of toxin for the test.
- (2) Control toxin of 1-1000 dilution to be boiled steadily for at least one hour.
- (3) The use of syringes separately for test toxin and control toxin. Interchange of syringes from one series to another without previous boiling for one hour may give rise to numerous reactions, which would be read as positive-combined or negative-pseudo due to traces of toxin remaining in the previous two syringes.
- (4) Bottles used for bottling toxin and control toxin must also be kept separately for the same reason as just described.
- (5) Readings should be made at the end of 12-16 hours so that faint positive reactions, which disappear rapidly between 12-24 hours, will not be missed and interpreted as negative.
- (6) Repeated tests to be done on a fresh site, not over old area. Following a test, there is a local resistance established to the same dilution of toxin.

CONCLUSIONS

- (1) The Dick test is a reliable index of immunity and susceptibility to scarlet fever.
- (2) It serves to indicate the susceptible persons who need immediate passive immunization with scarlet fever antitoxin.
- (3) It also serves to indicate susceptible persons who need passive immunization by repeated dosage of Dick toxin.
- (4) It will serve as the agency for standardization of scarlet fever antitoxin.
- (5) The Dick test aids in the diagnosis of doubtful cases of scarlet fever.
- (6) The test might be applied to the study of various strains of haemolytic streptococci to determine specific character of toxin produced.
- (7) A new impulse will be given by application of the test to the study of scarlet fever.

REFERENCES

- (1) Dick, G. F. and Dick Gladys H.:
"Immune Reactions in Scarlet Fever". *Journal of Infect. Diseases* 19:
636-638 (Oct.), 1916
- (2) Dick, G. F. and Dick, Gladys H.:
"A Skin Test for Susceptibility to Scarlet Fever". *J.A.M.A.* 82:265
(Jan 26), 1924.
- (3) Branch, C. F. and Edwards, F. G.:
"The Relation of the Dick Test to Scarlet Fever". *J.A.M.A.* 82:1260
(April 19), 1924.

- (4) Zingher, A.:
"Results Obtained with the Dick Test in Normal Individuals and in Acute and Convalescent Cases of Scarlet Fever". Proc. Soc. Exper. Biol. and Med. 21:293 (March), 1924.
 - (5) Zingher, A.:
"The Significance of the Pseudo-reaction in the Dick Test and Methods used for its Identification". Proc. Soc. Exper. Biol. and Med. 21:385 (April), 1924.
 - (6) Zingher, A.:
"Further Studies with the Dick Test and Active Immunization with Scarlet Fever Streptococcus Toxin". Proc. Soc. Exper. Biol. and Med. 21:508 (May), 1924.
 - (7) Zingher, A.:
"The Dick Test in Normal Persons and in Acute and Convalescent Cases of Scarlet Fever. Immunity Results with Scarlet Fever Toxin". J.A.M.A. 84:432 (August 9), 1924.
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The Bacteriology of Scarlet Fever

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UNTIL quite recently little was known about the aetiology of scarlet fever. At the moment it would seem a well-established fact that the haemolytic streptococcus occurring with such striking regularity in the throat and naso-pharynx of scarlet fever patients early in the disease is the causative agent.

From time to time different investigators have reported on the presence of streptococci in relationship to scarlet fever, and though other organisms have been described as occurring in the disease and with possible aetiological significance most workers have been attracted to the role of the streptococcus.

Crooke, as early as 1885, according to Von Lingelsheim, demonstrated the presence of streptococci in scarlet fever victims.

Baginsky and Sommerfeld in 1900 examined a number of scarlatina cases with reference especially to streptococcus infection, and reported the presence of streptococci in the heart's blood of eight patients who had died after an acute and short illness. They expressed the belief that the acuteness of the illness and the rapidity of death in these cases precluded the possibility of the streptococci being merely secondary invaders.

For some time evidence has been accumulating in establishing that the streptococci found in scarlet fever possessed certain characteristics which distinguished them from other streptococci. Early in these researches it was found that immunological methods were the only satisfactory means of studying streptococci. While technique among the various workers attracted to this field varied considerably the principle involved was the same. Haemolytic streptococci were collected from the throats and discharges of scarlet fever patients and from many other conditions in which they occur. By the use of immune sera agglutination tests were performed. Moser and von Pirquet (1902, 1903) were among the earliest to point out the fact that haemolytic streptococci from scarlet fever fell into a group by agglutination methods, separate and distinct from haemolytic streptococci from other sources. Other workers about the same time including Aronson (1903), Neufeld (1903), and Weaver (1904), were not able to confirm this specific serological grouping. More recently,

however, the results of Moser and von Pirquet have been confirmed by Tunnicliff (1920), Gordon (1921), Bliss (1922), Eagles (1924), Dochez and Stevens (1924). On the other hand Williams (1924) and her associates and the Dicks (1924) have reported that there is not sufficiently clear-cut cross agglutination between the strains of scarlet fever streptococci to warrant such a conclusion.

Until the work of G. F. and G. H. Dick was published establishing the haemolytic streptococci found in scarlet fever cases as the causative agent, scarlet fever had been considered a disease of unknown aetiology. Mallory (1904) suggested protozoan-like bodies which he had discovered at autopsy in scarlet fever cases as the possible cause. Mallory and Medlar (1916) described a diphtheroid bacillus which they called "*bacillus scarlatinae*." Di Cristina (1923) reported an anaerobic organism obtained from the blood and spinal cord of scarlet fever victims. Parker (1922) reported a gram positive diphtheroid bacillus which produced a toxin neutralized by an anti-toxin as the possible cause.

Early attempts to produce scarlet fever by experimental means were not successful. Landsteiner, Levaditi and Prasek (1911) claimed to have successfully inoculated chimpanzees with scarlet fever by injecting blood from patients and also by rubbing the throats of animals with swabs taken from scarlet fever throats. Other workers were unable to duplicate their results. G. F. and G. H. Dick (1921) published their observations in human volunteers and were unable to produce the disease by any method, though some of the volunteers developed sore throat and fever but no rash. Similar experiments carried out on animals failed to produce a clinical condition resembling scarlet fever closely enough to justify a conclusion of experimental scarlet fever. It was then thought that the failure to produce the characteristic rash might be due to insusceptibility on the part of the volunteers used. Accordingly persons of a more intelligent type were selected whose personal and family histories could be satisfactorily obtained. In this second series of human inoculations a typical case of scarlet fever was produced by swabbing the tonsils and pharynx with a pure culture of a haemolytic streptococcus isolated from a lesion on the finger of a nurse who had acquired the disease while caring for a convalescent scarlet fever patient.

In order to prove whether this case of experimental scarlet fever was produced by the streptococcus in question or by a filtrable virus in association with it a second group of volunteers who gave negative histories of scarlet fever were inoculated with the filtrate of the same culture after it had been passed through a Berkefeld filter. These volunteers remained well. After about two weeks had elapsed these volunteers were inoculated with the unfiltered culture. Forty-eight hours later one of

them developed clinical scarlet fever. This experiment furnished evidence that the disease had been caused by the haemolytic streptococcus and not by a filtrable virus.

Since the haemolytic streptococcus is found in the throat and rarely in the blood stream it was considered that it was not the presence of the organism in the skin which caused the rash. The question then arose by what means the organism growing in the throat caused the rash. The Dicks (1924) showed that the streptococcus of scarlet fever was capable of producing a soluble toxin. This toxin is thought to be responsible for the rash.

When one considers the bacteriological evidences in addition to those accumulated by various workers on the Dick test, described elsewhere, it would seem that the haemolytic streptococcus found in the naso-pharyngeal cavities of patients suffering from scarlet fever has been finally identified as the probable aetiological agent in the disease.

REFERENCES

- Aronson (1903). *Deutsch Med. Woch.* Vol. 25, 439.
Baginsky and Sommerfeld (1900). *Berl. Klin. Woch.*
Bliss (1922). *Jour. Exp. Med.* Vol. 136, 5, 575.
Cristina, Di, (1923). *Jour. A.M.A.* Vol. 80, 806.
Dick, G. F. and G. H. (1921). *Jour. A.M.A.* Vol. 77, 732.
" " " (1923). *Jour. A.M.A.* Vol. 81, No. 14, 1166.
" " " (1924). *Jour. A.M.A.* Vol. 82, No. 2, 84.
" " " (1924). *Jour. A.M.A.* Vol. 82, 265.
Dochez and Stevens (1924). *J. Exp. Med.* Vol. XL, No. 4, 493.
Eagles, G. H. (1924). *Br. Jour. Exp. Path.* Vol. V, 199.
Gordon, M. H (1921). *B. M. J.* Vol. 1, 631.
Mallory and Medlar (1916). *J. Med. Res.* Vol. 34, 127.
Neufeld (1923). *Zeit. F. Hyg. u. Inf.* Vol. 44, 161.
Parker (1922). *J. Med. Res.* Vol. 43, No. 4, 387.
Tunncliffe (1920). *Jour. A.M.A.* Vol. 74, 1386.
Weaver (1904). *J. Inf. Dis.* Vol. 1, 91-106.
Williams, A. W., Hussey, H. D., and Barzhaf, E. J. (1924). *Proc. Soc. Exp. Biol. & Med.* Vol. 21, 291.
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"A Look Forward"

MRS. CLIVE NEVILLE ROLFE, O.B.E.,

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Address given before Toronto Social Hygiene Club, November 25th, 1924.

"I CANNOT tell you with what pleasure I address you or with what gratification I have watched the steady development of an advanced programme of social hygiene in Canada. May I say before touching on the main subject of my address to-night, "A Look Forward," that I wish to heartily congratulate the Toronto Council on the formation of a Women's Club to act as an auxiliary to its work. I can see many fine possibilities in this idea. I wish to thank the Toronto Club for this function held for myself, and to assure them that I will carry back to Britain a determination to introduce Women's Clubs into the 89 branches of our organization in the United Kingdom.

In order to look forward, we must think back. In the past ten years there has been tremendous progress made in Britain with regard to social hygiene. Ten years ago it would have been a terrible thing for a woman such as myself to address a mixed audience on the venereal disease aspects of public health questions. Nowadays it is not at all terrible. Social hygiene has become simply a department of any national programme for community and private health.

We have begun to assimilate the composite results of the medical sciences. We begin to realize that we are all responsible,—women as well as men,—for the application of these results to our living conditions. Our material civilization has grown apace. Material advantages can be and are passed on. But are we not responsible also for the passing on of things other than material? The pessimists say that, despite the veneer of civilization man is still a natural savage. I do not believe this to be true. The natural man has been greatly modified by the civilizing process. Let us stop there and take stock of ourselves. If we do this we shall see that it is no use going on increasing our material progress unless we develop with it the altruistic side of life. The assimilation of the findings of science will assist in this direction, for in the essence of things science and religion are one. They point humanity forward and up.

All political and international progress is dependent on biological progress. It is absolutely no use giving the finest civilization to a race of

morons. It is the business of science to raise the general intelligence. But it is our business—those of us who can apply the findings of science—to actually accomplish this result. It is not enough that super intellects should govern groups of morons—with a wider diffusion of knowledge must come a wider sense of responsibility and women must take their share with the men.

Yes, even for creation itself. We have all eaten the apple. It has stuck in some men's throats. But we are still eating it. Let us see, if we cannot by concerted effort, digest the apple of knowledge and gain a better human soul thereby. For there is unity in truth. I must emphasize again that science and religion are one. They set before us the very same thing from different angles. They lead the same way. Racial improvement is one objective. We must all try to assist creative forces. It is good religion as well as good science to remember that two feeble-minded parents will produce a race of morons and that the social inadequacy thus produced reacts on all the conditions about us, causing many of our worst social problems.

Investigations made show that poverty is largely due to this inadequacy. We get generations of these Weary Willies and Tired Tims. It is bad biological stock and moralists can do little with bad biological stock. Bad stock is far too often the result of syphilis. It is our fault if it is produced and perpetuated. When we were ignorant of the laws governing health and inheritance, we were not responsible to the same extent. Now that we do know we are responsible. This is the worst type of race suicide. The production of the unfit.

On the other hand, we must remember that ability is also inherited. We can have an inadequate Jukes family with its hundreds of feeble-minded descendants or we can have good stock. I recall one remarkable family in Britain. Out of 146 descendants all but 25 attained real distinction, and this was true of both men and women. Yes, I know that the women were for the most part distinguished only by reason of bearing distinguished sons and daughters. But they were able women and had able children. Such women in the present and coming times will be able to record themselves, not only as mothers, but as citizens and in many capacities of usefulness to the state. We have progressed.

Look at European developments in the past ten short years and you will see that we have reason for great hopefulness. Venereal diseases have always presented one of our worst social problems. You all know the terrific figures for congenital deafness, blindness, or other afflictions due to these diseases. But it is only of late we have been permitted to apply this knowledge. Before the war eugenis had a hard time and hard

going. Few people wanted facts mentioned. Fewer still would face them when they were mentioned.

War did one thing, at any rate. It forced us to face the facts about these diseases because the fitness of the fighting man was a matter of national importance and we had to know the worst before we could test our own strength in man power. So, at last, the eugenists ceased to cry in the wilderness. They got a hearing in the market place.

The drop of 29% in the incidence of syphilis in Britain in the past ten years is just one indication of what actual scientific knowledge applied to actualities has done. We begin to realize that children have a right to be born free of this terrible infection and that we are responsible as a community if they are not so born.

We see, at last, that this is a community problem, and we aim at reaching all members of the community with the facts. It is to be noted that the countries where women have entered into public life and registered strongly as citizens, are the very countries where this racial problem has been forced home to the community and politicians.

Britain, American, Australia, Canada and the Scandinavian countries are all arriving at the same conclusion, namely, that this is merely another public health problem and as such must be handled scientifically, as tuberculosis has been handled and well nigh conquered, and as cancer is being handled, or other social scourge.

In most of the countries mentioned we have now "Health Weeks," where whole communities turn to the consideration of pre-natal care of infants, child welfare, tuberculosis and venereal diseases. Doctors, clergymen, social workers, teachers and pupils, industrial employers or employees, women of the homes, business men, all classes of people assist with or attend health exhibits and take part in health weeks. We begin to make progress.

In some countries the educational aspects of social hygiene are being dealt with in schools. Why, in Norway, Sweden, Denmark and Holland there is a move of late to pass laws making social hygiene training compulsory for the young of both sexes.

Even in Belgium where, owing to overcrowding, social conditions have been very far from desirable for young people, there is a definite move in the direction of abolishing entirely the regulation of vice, and all public recognition of prostitution. This is a tremendous step in advance. France and Germany also are falling into line in the same direction. In France there are now 339 municipal clinics for the treatment of venereal diseases. There is a general move in Europe toward a far more enlightened policy with regard to commercialized vice, and I look forward confidently to a

day when state regulation will be done away with in all European countries. It is an ostrich policy. It does not work.

It is of great interest to note, too, that our friend Mussolini has decided to abolish venereal diseases and has promulgated a whole series of regulations to this end, but the Russian situation has even more remarkable aspects. In Russia, as you perhaps know, the Bolsheviks have abolished marriage as a state institution. Individuals are to be free, there are to be no family ties, and all children are the property of the state. You have read or heard of the resultant appalling mortality among children in Russia. With the disintegration of the family and the demoralization of the state, the children of Russia have been the worst sufferers. The incidence of venereal diseases among Russian school children is to-day one of the most sickening indications of the failure of the Bolshevik plans at making over their world. Their ideas strike at the biological foundations of society. The family is not only the social and government unit, the economic unit, but the biological unit.

On the stability of family life depends the strength of the foundation of civilized society. The Russian communists, in their mad haste to make over the social order, have attempted to destroy not only tradition itself but this unit of the family.

If they had been really scientific reformers they would have turned their attention to some process of selection for parenthood so that they might produce the supermen of whom they talk. Any ideal for a reformed society must not throw out, but emphasize the need for stabilization of family life. Is promiscuity natural and therefore right? Science says no.

Primitive man can be shown to have been a monogamist. Anthropologists of note now give the lie to the statement that he was polygamous. The economic urge has been one of the greatest factors in all of the upward growth of man, and primitive man soon found that he could support only one family. Social hygiene ought to present the case for scientific monogamy.

The younger generation must be served with not only statements, but demonstrations. They demand proofs and will question anything but proof.

Well, anthropologists are now pointing out that monogamy is a racial characteristic of many tribes of primitive man in Africa or elsewhere. The trouble is that while we have civilized thoroughly one of the deepest instincts of the race, that of self-preservation, so that at the call of tribe or race or country our men at arms respond instantly to the altruistic call, and fight, not for themselves, but their country, we have never civilized

the equally deep instinct for racial preservation. It has been allowed to dominate, not wisely but too well.

We are only now beginning to see that we must build up a new tradition along these lines. Our laws at present do a little. In the beginning, if one man in a tribe hated another, he took his club and bashed in his head or got his own bashed in. But civilized society legislated against this. Now we put homicidal maniacs away. Such men are not selected for parenthood and the perpetuation of the race.

We are only beginning to see that common safety and prudence also demand that we shall in some way protect ourselves and the race from the perpetuation of the feeble-minded or unfit.

But our long continued, traditional refusal to deal with the sex instinct and racial perpetuation scientifically have had very disastrous results. We need to break this conspiracy of silence.

We must now teach adolescents how to control the sex instinct. Then men and women will become really civilized. See how when women entered the industrial field, difficulties quickly arose. Boys and girls alike need satisfaction of their normal instincts, but they must understand both them and themselves if this is to be safely done.

All social hygiene movements recognize this necessity. We must do away with morbid curiosity and put in its place a matter of course instructed intelligence regarding the fruitions of life and our normal appetites.

In Britain we are giving this education to older children. Not in school hours, or as part of a school curriculum, but in school buildings. It is true that parents ought to be able to impart this knowledge, and we look forward to the day when parents can and will. But are they able nowadays? Not always. And far too often the heavy end of the job is left to the mothers. Fathers are quite as deeply concerned and should share the responsibility.

It may sound like a joke to say it, but it is true that the development of the real spirit of paternity was one of the last things to happen in the process of evolution.

Men are coming to see that much must be done. There are too many fossilized minds. It is a tragedy to get middle-aged in mind. And above all things it is essential that parents should have clear thought and clean minds on the subject of evolution, the origin of life and the processes of nature.

We must begin early to teach children the inevitability of cause and effect. Patriotism must be widened to inspire not only our best services to our country but to posterity and the world.

Let us try to get a sense of responsibility into our young people so that, naturally, they will think for the future of the race. The youth of to-morrow cannot be allowed to accept promiscuity as the natural, permissible process of nature. We must at last civilize if we can the racial instinct by educating both mind and body. One great way is through adequate recreation, amusements, occupations for the young. Our propaganda at home begins to bear fruit. It is not by accident that since the close of the war the Boy Scout and Girl Guide organizations have grown from 140,000 to 550,000. Our aim is that every young person leaving school shall be linked with at least one organization which will provide adequate outlet for surplus energy and self-expression.

Our Mental Deficiency Act at home begins to deal with another great angle of the same problem. But delinquent youths really present a criticism of our social order. We owe it to delinquent youths to remedy the conditions producing them.

Custodial care is not all that is necessary. We must provide an atmosphere which will reform their warped minds. It is useless in Canada, Britain or anywhere else to leave delinquent girls or women in institutions with empty hands and minds.

The only excuse for indeterminate sentences is that we shall show some definite result by way of improvement in these delinquents. If you have 75% recidivists in these institutions you may feel quite certain that something beside the delinquents is radically wrong.

It is absolutely no use shutting up a feeble-minded boy or girl for two or three years if they are to be let out at the end of that time to run loose.

Statesmen of the future will be those who pass legislation which will look after not only conditions of to-day but to-morrow. They will have a forward look.

This is every man's and woman's job. It is our job to see that preventable diseases or mental deficiency are not carried into the next generations. And it is youth that must carry the torch. Our youth of to-day have the spirit to do it. We must see that they have the knowledge so that the torch may be carried to all the dark places of the earth.

Prematurity as a Factor in Infant Mortality

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THE figures used in this paper are those reported in the City of Toronto during the last ten years—the whole period through which it has been possible to separate out “prematurity” from “other diseases of early infancy” on the death registration certificates. In view of the fact that terminal conditions, such as broncho-pneumonia, are often given as the cause of death, particularly among the older premature children, it is fairly certain that the figures given are conservative rather than in excess of the number actually attributable to this cause.

Since all birth registration figures exclude still births, no account has been taken of still births registered which were certified as premature or of some months duration under full term. The registration of still-births we know to be incomplete, but of those registered approximately 50% are reported as premature. The total number of pregnancies that terminate prematurely probably does not fall very far short of twice the figures used throughout this paper.

In the last ten years the number of deaths under one year from all causes, per 1,000 live births registered, has dropped from 111.5 to 74.2, a reduction of 37.3. If we exclude from the reckoning the deaths credited to prematurity, the reduction would be 36.6,—for all practical purposes an identical figure, indicating that the entire reduction has been among causes other than this one, *i.e.*, prematurity. A glance at the prematurity death rate verifies this conclusion. In 1914 it was 18.4 per 1,000 live births registered; in 1922, 19.5.

PREMATURITY DEATH RATE

Year	Rate per 1,000 live births
1914	18.4
1915	19.6
1916	18.2
1917	15.8
1918	20.1
1919	22.0
1920	22.3
1921	19.2
1922	17.7
1923	19.5

As the number of deaths from other infantile conditions has decreased, the proportion of infant deaths due to prematurity has gradually mounted. In 1914 16.5% were due to this cause, and in 1923 26.4%. The actual figures are even more striking. Last year, out of a total of 973 deaths under one year, 257 resulted from prematurity.

Year	Deaths under one year all causes	Deaths due to prematurity	Percentage of total infant deaths
1914	1557	257	16.5
1915	1374	246	17.9
1916	1349	224	16.6
1917	1112	186	16.7
1918	1238	237	19.1
1919	1143	248	21.6
1920	1430	305	21.4
1921	1208	268	22.2
1922	985	232	23.7
1923	973	257	26.4

The great majority of deaths registered as due to prematurity occurred in the first month of life. It is probable that the deaths of most premature babies dying later in life were ascribed to more definite causes, such as broncho pneumonia. The percentage of prematurity deaths occurring in the first week of life was 72, and in the first month 91.

AGE AT DEATH FROM PREMATURETY.

Year	Total number	Under 1 week	1 week to 1 month	Over 1 month
1919	248	176	49	23
1920	305	222	45	38
1921	268	179	66	23
1922	232	177	35	20
1923	257	198	41	18
Total in 5 years	1312	925	236	122
Percentage	100 p.c.	72 p.c.	19 p.c.	9 p.c.

Among the deaths from prematurity, the proportion of male babies to female is 58 to 42, or somewhat less than the proportion among deaths from all causes, which is 59 to 41. Among total live births, the proportion of male babies to female is 52 to 48.

About 65% of the babies born in Toronto are born at home. In view of this it is interesting to note that 138, or 54%, of the 257 premature deaths in 1923 died at home.

The figures we have at present, which we confess are somewhat incomplete, indicate that 87% of the women of child-bearing ages in Toronto were born in English-speaking countries. Our data regarding the nationality of the mother in the case of deaths from prematurity is also incomplete, but what we have shows a similar percentage, indicating that this problem is not affected to any great extent by racial characteristics.

Information regarding age of the mother is also incomplete. However, apart from a very slight increased tendency to premature birth at the early and late years of the child-bearing period, there is nothing to show that the age of the mother is a factor.

Prematurity, despite the educational work that has been done of recent years to secure better prenatal care for all mothers and unborn babies, still remains the greatest single cause of the death of infants. If this cause can be eliminated an immediate reduction of at least 25% would be effected in the infant mortality rate of the City of Toronto.

Malnutrition in Children of School Age

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MALNUTRITION is a clinical entity with a characteristic history, definite symptoms, and pathological physical signs. The malnourished child is a sick child and should be so considered. The signs and symptoms of this condition are many, mostly pointing to fatigue. The child is underweight for his height. He requires so many pounds of flesh to keep his bony structure erect. He has not this requisite and his normal body curves are accentuated. He is stooped, round-shouldered; his abdomen is prominent—he lacks tone. This fatigued attitude is noticed also in his nervous system. He is irritable, peevish, unattentive. He tires readily, lacking in physical and mental endurance owing to his unstable nervous condition. There is, in the general picture, a lack of the glow of health.

The history of Malnutrition clinics dates from 1908, when Dr. Wm. Emerson of Boston organized the first clinic, consisting of twelve cases. Nutritional classes have since been organized in the larger centres from coast to coast.

The observations and remarks in this paper are based on a study of 370 patients who have attended the Nutritional Clinic at the Hospital for Sick Children since the inception of the clinic on October 1st, 1919, to October 1st, 1924.

Malnutrition is a very common condition. It is estimated that one-third of the school children are under weight and yet little or no attention seems to be paid to it by the profession in general. There are no acute symptoms and the child is not considered sufficiently sick to remain in bed, let alone to remain home from school. While at school pressure is exerted if he falls behind in his studies—if he fails, he is considered lazy. That, I think, sums up the attitude towards him.

The age incidence of this condition was found to be as follows: (See Table No. 1.)

TABLE No. 1.

Under 6 years—24

6 years—53

— 77

7 years—65
 8 years—40
 9 years—44
 10 years—51
 —200

11 years—35
 12 years—33
 13 years—15
 14 years—10
 — 93
 —
 370

You will notice 77 cases were six years old and under. This group is really the pre-school child—and here we have definite evidence that malnutrition is also prevalent in children of pre-school age. The greatest number of cases was found to be at 7 years. From 7 to 10 years inclusive there were 200 cases, as compared to 93 cases in the next four years of school life. The reason there is such a large number of malnourished children under 10 years of age one cannot satisfactorily explain. Some factors to be considered are that children over 10 years of age are bound to have more out-door life. They do not require as much rest as the younger children. The child accustomed to a care-free life goes to school at 6 or 7 years of age, where he is restrained, and active competition occupies his mind. Probably one of the most important factors is that during this period in life the child runs the gamut of the acute infectious diseases.

The causes of Malnutrition were first thought to be due to poverty and improper food. Observations showed, however, that this condition was just as prevalent with the rich as with the poor. Furthermore, one would think that these malnourished cases were recruited from the ranks of the marantic and feeding cases of infancy (in other words, bottle-fed and not breast-fed infants). Our statistics on the duration of breast nursing in these children would contradict this impression. The breast-feeding periods of these cases were as follows: (See Table No. 2.)

TABLE NO. 2.

Length of time breast-fed	
Not breast-fed	43
Breast-fed 1— 3 mos.—	26
3— 6 mos.—	33
6— 9 mos.—	83
	—142

9—12 mos.—	103
12—15 mos.—	17
15—18 mos.—	20
18—24 mos.—	13
	—153
No history obtainable.....	32
	<hr/> 370

It was surprising to find the large number of cases breast-fed and also to find the large number who were at the breast for too long a period. There were 153 cases fed at the breast over 9 months and 33 cases were nursed over 15 months. There are various reasons for these long periods of breast feeding. In many cases mothers had no idea as to when a child should be weaned. That condition is rectified to-day by our Public Health Nurses. In some cases the child did not wish to leave the breast for other nourishment and the mother did not insist. One finds that it is a common belief, particularly among foreign women, that as long as a child is on the breast the chances of conception are reduced to a minimum.

In this series of cases little evidence was found to show that improper feeding in infancy was the underlying cause of Malnutrition. The few cases showing healed rickets were probably due to too long a period at the breast.

One other impression the casual observer of Malnutrition might obtain as the cause is that the parents are thin and the child is therefore naturally thin. In other words, it is a family trait. To dispel this idea let me quote the observations relative to this.

TABLE No. 3.

Thinness was a family trait in	164 cases
Thinness was not a family trait in	178 cases
The trait was variable in	28 cases
	<hr/> 370

You will notice the family characteristic plays no part. The weight of a child is judged according to his height. If a boy is so many inches high he requires so many pounds of flesh to keep the frame erect.

We have exploded the theories of the casual observer as to the cause of Malnutrition. We shall proceed now to enumerate the causes observed in this series of cases in order of their prevalence.

TABLE No. 4.

(1) Mismanagement	190
(2) Physical Defects	101
(3) Improper diet and faulty food habits.....	44
(4) Overfatigue	21
(5) Faulty health habits	14
<hr/>	
Total	370

(1) Mismanagement.

The cause of Malnutrition in over half of our cases was thought to be due to Mismanagement. There was absolutely no home control. Life for many of these undisciplined children is an unbroken series of dissipations. What they want they must have at any sacrifice to health. It is so evident in these homes that the child is in control and the parents are his willing or unwilling slaves. Probably the first evidence of lack of home control is the fact that the child nurses 15 to 18 months. When the parents fail to control a child of that age, what success need one expect in dealing with this same child at 10 years of age? Mismanagement is evidenced by a lack of discipline, and lack of system in the home. The child eats what he likes when he likes. He sleeps only when there is nothing else to do. There is no system whatever in his mode of living.

(2) Physical Defects.

One hundred and one cases of Malnutrition were due to physical defects. That is to say, it was thought that, the defects rectified, the child would return to normal health and normal weight. The principal defects were found in the mouth and throat. The examination of the throats of these children revealed the following information:

TABLE No. 5.

Tonsils and adenoids healthy	165
Tonsils diseased	153
Tonsils and adenoids absent	52
<hr/>	
Total	370
Tonsils and adenoids removed	75

In this series of cases 153 showed definitely diseased tonsils and adenoids; that is to say, the tonsils not only looked diseased but the

child had a history indicating previous infection of the tonsils. The history reflecting trouble from the throat showed heart trouble, chorea, rheumatism, growing pains, recurring attacks of cervical adenitis, recurring attacks of fever or recurrent vomiting. In cases in which there was no mismanagement, and in which the diseased tonsils and adenoids were the only causative factor, after their removal the children improved rapidly and their weight returned to normal.

Another very prevalent physical defect was carious teeth with the alveolus involved. Relative to the teeth, the following statistics were made: (See Table No. 6.)

TABLE NO. 6.

Good teeth	148
Carious teeth	222
	<hr/>
	370
Received dental treatment	137

In observing these cases, one found that a carious tooth soon gave trouble by aching and that the gum soon became inflamed with a resulting alveolar abscess. Not until the mouth and throat were clean was the child placed in such physical condition that steady gain in weight was possible.

The intracutaneous tuberculin test was performed in each instance to ascertain the presence or absence of a tuberculous focus, and the findings tabulated revealed the following information:

TABLE NO. 7.

Cases—Positive reaction	45
Cases—Negative reaction	325
	<hr/>
	370

No history of exposure to tuberculosis was obtained in any of these cases. The X-ray showed varying degrees of Mediastinal Glandular involvement in the positive reactions. These positive cases were referred to the chest clinic and from there to the preventorium. Trace was lost of these cases in almost every instance. The few, however, who returned to our clinic showed a marked gain in weight while at the preventorium, but we found they had difficulty sustaining that weight when they returned to their homes.

It is also of interest to observe the finding in the Cardiac Clinic and Syphilitic Clinic as recorded in Table No. 8.

TABLE No. 8.

CARDIAC CLINIC

Cases—Normal weight	8
Cases—Over 7% underweight	12
Total	20

CONGENITAL SYPHILIS CLINIC

Cases—Normal weight	13
Cases—Over 7% underweight	11
Total	24

There were many other physical defects but they were mostly associated conditions. They were not causing Malnutrition but in many cases they followed after Malnutrition had been present for some time. (See Table 9.)

TABLE No. 9.

PHYSICAL DEFECTS FOUND

Carious Teeth	222	Asthma	1
Diseased Tonsils and Adenoids	153	Eye Conditions	8
Rachitic Deformity	46	Otitis Media	8
Tuberculosis	55	Alveolar Abscess	8
Cardiac Conditions	25	Chronic Constipation	8
Chronic Nasopharyngitis ..	14	Cervical Adenitis	11
Bronchitis	11	Deflected Nasal Septum	3
Secondary Anaemia	11	Infantile Paralysis	3
Intestinal Parasites	7	Thyroid Enlargement	5
Enuresis	7	Chronic Appendicitis	2
Chorea	6	Granular Pharyngitis	2
Rheumatism	1	Catarrhal Jaundice	1
		Pyorrhoea	1

(3) *Overfatigue.*

Overfatigue is one cause of Malnutrition that is frequently overlooked. When all visible causes for failure to gain have been removed and no results follow, one should strongly suspect overfatigue. The

two conditions of fatigue and overfatigue must not be confused. Fatigue is a natural condition following exercise and from this condition one soon recovers following rest. Overfatigue carries one below the point where recovery follows quickly. Each spasm of exercise following overfatigue carries the child lower. He loses the desire to eat and even to play. He seems tired out all the time. This condition of overfatigue may be brought on by excessive play, too little rest, excessive competition in school, or too many interests in school, play, and social clubs. Adults seldom appreciate how much energy and strength are required in simply growing. They do not take into account how often the child is overtaxed in trying to keep up with older people, not only in the routine activities of a day but in adapting himself to the various tools and equipment of a world that is designed for grown-ups. This condition of overfatigue is corrected by limiting the child's activities, and by additional rest. An overfatigued child should sleep the clock around with additional rest periods during the day. To rest, the child must be given every encouragement to sleep, by covering him in bed, with his shoes removed, with the blinds drawn and with the child facing away from the light. Light is a strong sensory stimulus which affects the depth of sleep. It has been proved that sleep is much deeper during the long dark nights of winter than during the light summer nights. Mothers all complain of daylight-saving affecting the sleep of their children. Their observations are quite correct.

There is only one measurable test as to a child's improvement from overfatigue and that is the gain in weight. As the weight curve rises, the languid child is seen to free himself from his lethargic attitude.

(4) Improper Diet and Faulty Food Habits.

The feeding of infants has become standardized to such an extent that his food is accurately prescribed, but in the older child little or no care is taken, and their feeding is a matter of guesswork. One often wonders why a physician is so careful in prescribing a drug which is administered only occasionally and takes so little interest in arranging food for his patient which is taken daily. Children ranging in age from 7 to 14 years and underweight 7% or more require the diet of a normal man. One does not stop to consider the requirements of a growing child. It is estimated a malnourished child requires between 2,000 and 3,000 calories a day. In order to prescribe food intelligently one must have a rough value of food in terms of calories. The types of food we eat during the day are very few in number, and in a few minutes one can learn their food values in terms of 100 calories. For example, a lamb chop, a potato, 1 slice bread, 1 pat butter, 1 large egg, 1 apple, 4 table-

spoons porridge and 5 ounces of milk are each 100 calories. From that alone one could figure a fair diet for the day.

Each child attending this clinic fills in a form which tells us the amount of food he eats daily. You would be surprised to find how many children of school age receive only half of their requirements. The chief complaint of the parents is that the child will not eat. This we find due to many causes. These children eat varying amounts at each meal. It is similar to giving an infant 2 ounces at one feeding and 12 ounces in 4 hours' time. Candy is a great offender. This is pure sugar and is an irritant to the stomach. Back of candy eating is the bad practice of giving children money to spend. Overfatigue is another cause; the child is too tired to eat and this may be Nature's way of protecting digestion, by not overloading a fatigued stomach which naturally suffers proportionately to the rest of the body.

Relative to constructive ideas to improve the amount of food taken, one must see that the child gets well balanced meals with the 2,500 calories almost equally distributed over at least 3 meals. The child, if fatigued, should have one-half hour's rest before meal time. He must chew his food as long as there is taste to it without washing it down with liquids, and he must take at least 20 minutes by the clock at each meal. Food of high caloric value must be given with no nibbling of food throughout the day, and no attempt made to satisfy a fickle appetite, giving only wholesome foods. Never, at any time, should medicine be given with food as a vehicle. Cereal, milk and vegetables must form the backbone of the diet, otherwise one cannot continue to give the calories required without impairing the child's digestion. As an example of improper feeding, the findings relating to Tea and Coffee drinking will suffice. (See Table No. 10.).

TABLE No. 10.

TEA OR COFFEE VS. MILK.

Milk only	140
Tea or Coffee	230
<hr/>	
Total	370

One glass of milk is worth 160 calories whereas one glass of tea is worth only the milk used to color it—approximately 10 to 15 calories. This habit of tea drinking commences with the child refusing the milk. Tea is added as an incentive. More and more is demanded by the child and soon the mother is giving her child tea in a vain effort to bolster up an appetite.

(5) *Faulty Health Habits.*

The last, and by no means the least, cause of Malnutrition is faulty health habits. One cannot bring a malnourished child back to normal without regulating such fundamentals of health as rest, fresh air, bathing and proper clothing. Children sleeping in tents and porches gain more readily than those sleeping in rooms with the windows opened. The good habit of sleeping with windows opened is the best we can hope for in a crowded city. Every malnourished child should have two full baths daily—a warm one on retiring and a cold bath on rising. The patient must be worked up gradually to the point where cold baths should be given. This is done by using lukewarm bath water and making it colder each morning. If the skin remains blue and cold following a bath the bath is doing no good, and future bathing should be done in warmer water, gradually cooling it. The full value from a cold water bath is obtained when the skin becomes flushed and there is a feeling of well being. It is possible to get the circulation in such good condition that, on splashing cold water over the child's body, it will immediately flush up and in some cases almost become scarlet. Malnourished children have usually poor peripheral circulation and require more clothing than the normal child. Sufficient clothing to keep the body warm, but not perspiring, should be used. The amount of rest should be increased. Twelve hours of uninterrupted rest at night with rest periods during the day. If the child is well enough to go to school a noon rest of half an hour may be quite sufficient to allow him to gain, if not, his school and play periods must be reduced. Constipation is really a symptom of indigestion corrected by regular evacuation of the bowels and proper diet containing coarser foods.

The home conditions in these cases were classified as follows: (See Table 11.).

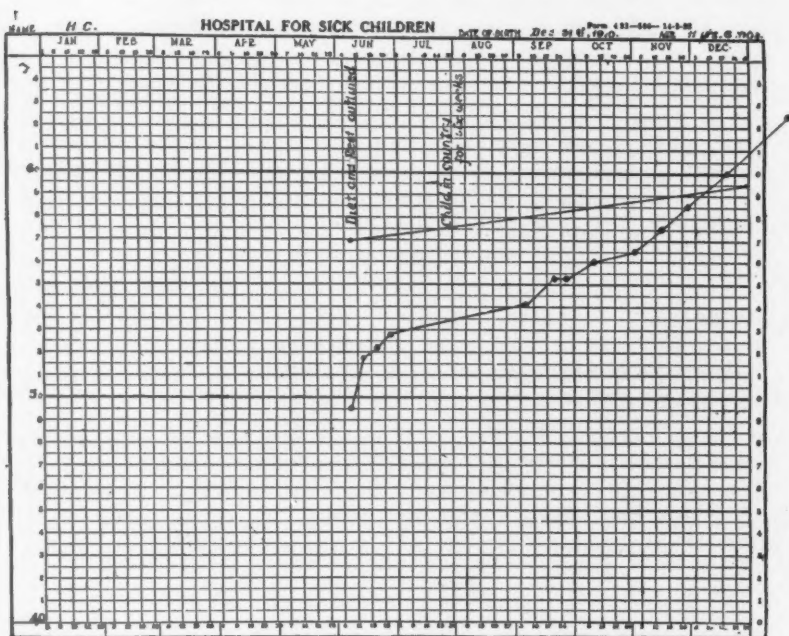
TABLE No. 11.
HOME CONDITIONS

Good	81
Fair	176
Poor	100
Not recorded	13
	<hr/>
	370

Having corrected all physical defects and the causes of malnutrition revealed in that specific case, it is then considered the child should make

a steady gain in weight. The improvement in this condition is measured by the increase in weight and the corresponding advance in the weight curve. Each child is weighed weekly and the weight charted. As the child grows older his weight requirement is increasing. In our charts one line indicates the child's requirements in weight according to his height. The flexible line underneath is the child's actual weight from week to week. The child reaches normal when the two lines meet.

The following chart will indicate the type of records kept:



Conclusions.

1. The causes of Malnutrition in order of their prevalence are, mismanagement, physical defects, improper diet and faulty food habits, over-fatigue and faulty health habits.
2. Malnutrition is prevalent in pre-school children.
3. Family traits play little or no part in Malnutrition.
4. Diseased tonsils and adenoids, and teeth are the main physical defects causing Malnutrition.

5. More care must be exercised by the parents and the profession in arranging the diets for older children.

6. A child who fails to gain over a period of months should be given a complete physical examination to ascertain the cause and rectify it.

7. The home is the battle ground for Malnutrition and without the co-operation of the parents in observing proper food habits and health habits, failure is sure to follow.

8. A steady advance in weight is one of the most reliable tests of good physical condition and the surest indication of proper growth.

9. Every child applying for entrance to the public school should be examined in the presence of his parents and required to be up to normal weight before he is allowed to assume the burden of full school work.

10. Healthy, happy children, well nourished, up to normal weight have reached their goal and are maintained there by regular meals, regular work and play, regular rest and sleep and regular bodily functions.

I desire to express my appreciation to Dr. Alan Brown, Physician-in-Chief, for permission to report these cases and for the use of illustrative photographs.

The Sanitary Inspectors' Association of Canada

WATER AND WATER SUPPLIES

By H. S. HANCOCK, JR., A.M.E.I.C.,
Assoc. M. Am., Soc. C. E., Fort William, Ontario.

(Read before the Annual Convention, Fort William, Ont.)

FIRST I would like to express my appreciation of the privilege accorded me in being thus permitted to address your very important Association. Although comparatively young in years it has already proved a giant in achievement and will, without the least doubt, go on from strength to strength in its important and beneficent work for the welfare of humanity.

The magnitude of the subject allotted to me is so great that it will be possible to touch only a few of the innumerable features of importance which it contains.

As a preliminary I will ask you to reflect on the almost controlling influence that this element has had on the history and destiny of the human race.

Almost immediately after mankind had realized the important advantages to be secured by banding themselves together in communities for the purpose of defence and trade the presence of water, both potable and navigable, determined in no small measure the location of every important settlement and, in proportion to its adequacy, so did communities and nations expand and flourish.

So established, intercommunication between the various settlements naturally followed and frequently the shortest route lay through arid desert. Among the infrequent oases few, if any, furnished a spring or artesian flow, but it was obvious to the primitive intelligence that vegetation flourished because of the presence of water below the surface. From the first elemental expedient of scooping shallow holes to reach the closest of these subterranean supplies it was a logical step to follow the water down in times of exceptional drought by means of wells shored up by logs or the easily-worked desert sandstone.

The period when this, the first artificial method of obtaining a water supply, was introduced cannot be determined but from our certain knowledge the Chinese sank deep wells, even through solid rock, as early as two thousand years before Christ and as the supposed cradle of the

human race is located in a district where both the need and the mentality were so much greater we can be reasonably certain that Assyria, Arabia and Egypt ante-dated this achievement by many centuries.

The absence of mechanical pumping facilities made the use of deep wells laborious in operation and limited their use to the needs of a comparatively small population. This disadvantage naturally led to the construction of cisterns and reservoirs for the storage of rain water and eventually to the creation of aqueducts and canals for the transportation of water from some spring, river or mountain catchment area to the population of the first urban communities.

These aqueducts afforded an opportunity for some of the finest pieces of engineering achievement that have come to us from the ancient world, reaching their zenith, both in skill and magnitude during the halcyon days of the great Roman Empire. All the principal cities of the Empire were so supplied and no less than fourteen were constructed for the Eternal City itself, some being over forty miles long. Incidental to their construction valleys were crossed with tier upon tier of magnificent stone arches and the hills pierced by tunnels driven through solid rock without the use of explosives. Any rock that could not be barred or levered out was excavated by first lighting large fires at the tunnel face followed by the prompt application of cold water to the heated surface and thus generating steam in the minute crevices causing small explosions which slightly disintegrated the rock. Painfully slow as the process was it achieved its object and blazed the trail for modern tunnelling.

This era of aqueduct construction commenced about the year 300 B.C. and extended over a period of nearly six hundred years. The main object was to supply the public baths and fountains which formed such a striking feature of Imperial Rome. From the main reservoirs established on each of the seven hills local distribution was made by the aid of lead pipes, many exceeding twelve inches in diameter.

Outside the public institutions the ordinary people secured their water supply from public fountains and conveyed it to their homes in earthenware jars in the same manner as in the most primitive times. Naturally the amount used for domestic purposes was very small but so great was the public use in baths and fountains that the per capita consumption for the City of Rome exceeded 300 Imperial gallons per day which you may compare with the 40 gallons of the City of London and the 180 gallons of the most extravagant city of the extravagant Continent of North America, in this year of grace.

After the fall of Rome, due as much to her own physical, mental and moral decay as to the efforts of the German and Hun barbarian to find a place in the Sun, the entire subject of water supply in anything but

the most primitive form was neglected for many centuries. As a result Europe was periodically devastated by all manner of terrible pestilences almost invariably due to polluted water supplies. A reversion the more incomprehensible because the leaders of thought and action of that period were conversant with the Hebrew Bible which contained the clear cut sanitary regulations of the Mosaic Law.

More than a thousand years elapsed before the next effort was made to bring uncontaminated potable water to a city of any considerable dimensions. This work was undertaken by the personal work, and very largely at the personal cost, of a very distinguished Briton credited by history as one of the greatest sea fighters, navigators, explorers and what not? Anything but the pioneer of modern water and sanitary engineers. I refer to the great Sir Francis Drake who in the few years of peace that preceded the storm that culminated in the attempted invasion of the Spanish Armada devoted his time to the construction of the leat that carried the waters of Dartmoor, from the catchment area, of which Burrator and Sheepstor are the guardian sentinels, to the ancient town of Plymouth. In that town, without prejudice to his other achievements, they still do homage to his undertaking. Once in each year for the past three hundred and forty years the Mayor and Corporation of the Town of Plymouth have made their annual pilgrimage to the head waters of the leat and, with fitting ceremony, have drunk in old Madeira wine this toast:

"To the pious and glorious memory of Sir Francis Drake
May the descendants of he who gave us water never lack for
wine."

There were a few imitators during the succeeding two hundred years of which London's "New River" is the most important example, but it was not until the application of steam to pumping engines, first made in London in 1761, that the vast majority of towns were able to solve this primary necessity of a civilized community. In this connection it is interesting to note that with all the marvellously increased efficiency of pumps, engines and motive power, added to the practically complete perfection of our filtration systems, almost every city of importance reverts as soon as possible to the ancient practice of the Romans and secures its water supply from the uncontaminated catchment area of some mountain system. Glasgow has gone to Loch Katrine, Manchester to Thirlmere, Liverpool to Lake Vyrnwy, Birmingham to the Welsh Mountains, New York to the Catskills and Fort William to Kazazekeegewagamog, the "high lake of clear water that is always overflowing."

This desire for distant waters is based on the knowledge gained by bitter experience through the ages that man himself is the great pollutor

of his own water supplies and the unwitting cause of many of his most dangerous afflictions. In the sandy plains bordering the Tigris and the Euphrates, where probably the first great civilization developed, the water supply undoubtedly came from wells and rivers which for a long period were subject to frequent pollution from human excreta. It is quite evident that cause and effect were so intelligently noted by the Health officials of the period that a sewer built in Assyria in the ninth century before Christ under one of the palaces of Nimrod was built as a sanitary sewer in contradistinction to others of the ancient world whose prime object may have been only sub-soil drainage. This sewer is still in good condition and furnishes us with an example of the earliest known use of the arch in masonry. Another wonderful sewer, the Cloaca Maxima of the City of Rome, is still in active service although constructed over 2,500 years ago. Many other cities have well-preserved remnants of well-planned sewerage systems that date from before the commencement of the Christian era and there is no doubt that the ancient civilizations of Rome, Egypt, Assyria and Greece viewed the matter of sewage disposal as a matter of the greatest importance in preserving the purity of their water supplies.

As in the case of water, the "Dark Ages" succeeded in eliminating this essential safeguard from human thought and there was no sign of a revival of work or interest for over a thousand years. The modern revival of sanitary engineering originated in England but the construction of sewers seems to have been re-commenced primarily for sub-soil and surface drainage. As recently as 1815, the year of Waterloo, an ordinance was passed forbidding the emptying of faecal matter in the sewers. Such matter was allowed to accumulate in cess pools, either under the habitations of the people or adjacent thereto. This statute was not repealed until 1847, but even then sewer construction proceeded along the old lines. They were made neither watertight nor self-cleansing and were usually built large enough to permit the entry of men for the purpose of removing the accumulated filth. The effect of this practice on the purity of the water in the numerous shallow wells driven into the sub-soil waters can be better imagined than described. We can only conclude that the race would have been annihilated had water been the national beverage instead of ale, cider and Mountain Dew.

Shortly after this period modern construction commenced in earnest and the introduction of glazed, vitrified, close-jointed tile pipe laid on self-cleansing grades enabled even the smallest communities to progress along sanitary lines.

With the growth of industrial cities and the extension of many sewerage systems that discharged into rivers and streams a new problem arose

that threatened a greater sanitary evil than that caused by the previous laxity; and the pollution of these streams, which with the introduction of pumping machinery were largely used as sources of water supply, constituted a serious danger to the health of all the communities on the lower reaches.

This feature caused a detailed study to be made leading to the purification of both water and sewage and marked the opening of modern sanitary engineering and stimulated the research that has resulted in the wonderful organization that watches over and guards the Public Health.

It may be of interest to briefly outline the path trodden by the City of Fort William in achieving a water supply of particular excellence.

Although the present site of Fort William was used as a station by DuLhut during his exploration of Lake Superior in 1669 it was not until 1782 that it commenced its career of commercial importance. In that year the friction generated with the recently established United States over the use of the ancient fur highway across the Grande Portage of the Pigeon River caused the Canadian Traders to seek a new route to the West. From the mouth of the Kaministiquia River an old Indian trail named the Sioux trail because it was by this route that the Sioux nation conducted its forays into the territory of the Ojibway, led directly to the western plains. Consequently the great Northwest Fur Trading Company established its chief fur-trading post on this site and, in 1805, named it Fort William after the Hon. William Gillivray, then a prominent officer of the Company. Its importance as a fur-trading post began to wane when the Northwest Fur Trading Company was absorbed by the Hudson's Bay Company in 1821.

Fort William first attained prominence in modern times when in 1874 it became an important base of operations during the construction of the first Canadian Trans-continental Railway by the Dominion Government. Shortly afterwards this portion of the line was handed over to the Canadian Pacific Railway and only a small settlement survived the activity of the construction period.

The lake terminals and grain elevators of the Canadian Pacific Railway were consolidated at this point in 1890 and formed the nucleus of the present city. In 1896 the population had reached 2,500 and the first waterworks system was installed. The supply was taken, without filtration, from the Kaministiquia River and delivered to the mains by two Northey duplex compound pumps each rated at 750,000 Imperial gallons per twenty-four hours.

In 1905 the Grand Trunk Pacific Railway selected Fort William as the terminus of its Lake Superior Branch over which it expected to

handle the major portion of its grain and freight traffic during the season of navigation. This fact, combined with an immediate increase of population, foreshadowed the necessity of increased pumping capacity or the utilization of some other source of water supply.

Six miles south of the city, beyond the Kaministiquia River, set in the midst of high basaltic hills, is a lake of ten square miles in area with a watershed extending to thirty square miles. To the Ojibway it was known as Kazazeekegewagamog but a patriotic Scotsman of the Northwest Company thought it sufficiently like the original Loch Lomond, and so it is named to-day.

Loch Lomond is 332 feet above the level of Lake Superior, and is surrounded by bold, rocky hills forming a portion of the north-west coast range of Lake Superior. Its shore line is, for the most part, steep and rugged with occasional sheer cliffs of from one to five hundred feet in height. It probably averages about 75 feet in depth although soundings exceeding 350 feet have been made. There is one natural outlet on the east side about two miles from the northern extremity, through which the overflow is discharged into Lake Superior by means of the Carp River.

The valley of the Carp runs in a south-easterly direction and is shut off from the north by some of the highest hills in the range which end abruptly at the shore line of Lake Superior with almost precipitous cliffs, 800 feet high, precluding the feasibility of a gravity line direct from the Loch and compelling the driving of a mile long tunnel through the northern rim.

At the close of 1905 and during the early weeks of 1906 the city was visited by a typhoid epidemic of alarming proportions there being over 800 cases in a population of about 7,000, caused primarily by the water supply from the Kaministiquia River, which was found to be seriously polluted from various causes, the chief being the discharge of a small sewer about half a mile above the intake pipe of the pumping station.

This led to an insistent demand for Loch Lomond water, the writer was engaged as City Engineer and the construction of the present system undertaken.

The water is taken from the Loch through 750 feet of 36-inch steel intake pipe set at an elevation that permits the withdrawal of the top six feet of water from the Loch without exposing the top of the pipe. The outer end of the pipe is set in 38 feet of water. At the shore end of the intake pipe is a concrete valve chamber surmounted by a gate-house constructed of rock secured from the glacially deposited granite boulders found among the surrounding hills.

From the gate-house some 300 feet of a 4-ft. by 6-ft. concrete culvert leads to the tunnel section of 4,800 feet excavated entirely through solid rock and conveys the water to a semi-circular forebay 30 feet in diameter. From the forebay two cast iron pipes, one of 18 inches and the other of 24 inches diameter convey the water to a compensating concrete reservoir, some two miles distant and located on the crest of the bluff that overlooks the city. The water elevation held in this reservoir is 297 feet above the level of Lake Superior and furnishes a minimum pressure of 100 lbs. at every hydrant in the city.

Two 18-inch cast iron pressure mains serve the city, both crossing the navigable Kaministiquia River at a minimum depth of thirty feet below the surface of the river. This portion of the line consists of flanged pipe laid on concrete seats set in the bed of the river. It is proposed to reinforce this service by an additional 24-inch main during the coming winter.

The water itself is of exceptional purity and to avoid any possible chance of contamination the city have acquired title to practically the whole of the watershed. Similarly to all the waters of the Great Lakes basin Loch Lomond water is deficient in iodine content and Dr. Boyd has taken a prominent part with others in the movement that has resulted in the manufacture of an iodized table salt that it is hoped will banish the ill effects of this deficiency.

In conclusion, I beg to thank you for the opportunity of attending your Convention and to express the wish that a long and useful career may be the lot of each of you individually as well as that of the honourable Association of which you are such active members.

Victorian Order of Nurses

NEWS NOTES

The Executive Council of the Victorian Order of Nurses for Canada met in Toronto, November 17th, in the Assembly Hall of the Gage Institute, and the following members were present: Mr. C. A. Magrath, President, Ottawa; Honourable Mr. Charlton, Honorary Vice-President, Toronto; Mrs. R. W. Reford, Miss Muriel Galt, and Mrs. H. S. Birkett, Montreal; Mrs. J. B. Fraser, and Miss El. Smellie, Chief Superintendent, Ottawa; Mrs. A. J. Arthurs, Mr. H. H. Love, General Fotheringham, Mr. Capreol, and Mr. Hewitt, Toronto; and Dr. H. W. Hill, London.

On November 18th some members of the Executive Council, Mr. Magrath, Mrs. R. W. Reford, Miss Galt, and Miss Smellie, met the members of the Hamilton local association, and representatives from the local associations of St. Catharines, Miss Newman and Miss Stevens, and from Dundas, Mrs. Grafton. The meeting was conducted at the Victorian Order Centre, 29 Augusta Street, Hamilton.

Well Baby Clinic, Arnprior:

During the month of November a very flourishing Well Baby Clinic was organized, and is being conducted under the direction of the Victorian Order nurse, Miss Leila Wilson. The clinic is making very encouraging progress and is well supported by the people of Arnprior.

Home Nursing Classes, Huntsville:

Miss Mary Ririe, nurse in charge of the Victorian Order district of Huntsville, Ontario, reports the commencement of Home Nursing classes and a Girls' Health League.

Western Supervisions:

Miss Mary L. Boswell, Supervisor, is making a survey of the Victorian Order work in Western Canada, having spent some time in Winnipeg, Saskatoon, Edmonton, Calgary, and is now en route for British Columbia.

Supervisions in Ontario:

Miss Smellie, Chief Superintendent, visited the local associations, V.O.N. of Cornwall, Guelph, Whitby, Hamilton and Toronto during the month of November. Miss Mary Stevenson, Central Supervisor, has reported upon the following districts supervised: Mimico, London, Dundas, Trenton, Huntsville, Woodstock, St. Catharines and Belleville, in Ontario.

Belleville, Ontario.—Miss Lillian S. M. Shand, graduate of the Toronto University, 1922-23 course in Public Health Nursing, having obtained a V.O.N. scholarship, recently on the London staff, has been appointed to open up a new district for the Victorian Order in Belleville, November 15th.

Chatham, N.B.—A new district has been opened up by the Victorian Order of Nurses in Chatham, N.B., in charge of Miss Blanche Martell, graduate of the Public Health Nursing course, Dalhousie University, 1921-22, recently on the Halifax staff V.O.N.

Pictou, N.S.—The recently organized V.O.N. district of Pictou, N.S., has been given over to the development of Miss Laura H. Campbell, who being awarded V.O.N. scholarship 1923-24, graduated in Public Health Nursing from Western University, London.

Miss Maude Hulburt, a 1923-24 graduate of the University of British Columbia course in Public Health Nursing, also V.O.N. scholarship, has been appointed in charge of the Brockville district.

The assignments of other nurses who graduated from the 1923-24 courses in Public Health Nursing at Canadian Universities having had V.O.N. scholarships are as follows:

Miss E. Duncan, University of B.C., appointed to Edmonton staff.

Miss F. Fullerton, University of B.C., appointed to Saanich Health Centre, B.C.

Miss Grace Hill, University of B.C., appointed to the Saanich Health Centre, B.C.

Miss L. Moffat, University of B.C., appointed to the Greater Vancouver staff.

Miss B. Thornsteinson, University of B.C., given charge of the Cobalt, Ont., district.

Mrs. A. Grindon, University of Toronto, appointed to the Burnaby district, B.C.

Miss L. Lawder, University of Toronto, appointed to the Hamilton staff.

Miss E. M. Ratz, University of Toronto, appointed to charge of Sherbrooke, Que.

Miss E. Seeley, University of Toronto, appointed to charge of Burlington, Ont.

Miss Margaret Willis, Toronto University, appointed charge of Dartmouth, N.S.



The Provincial Board of Health of Ontario

Communicable Diseases reported for the Province by Local Boards of Health for the year 1924

Diseases	Cases	Deaths
Cerebro-spinal Meningitis.....	74	55
Chancroid.....	30	..
Chicken Pox.....	5791	..
Diphtheria.....	3473	268
Dysentery.....	..	14
Encephalitis Lethargica.....	46	30
Gonorrhoea.....	1685	..
Influenza.....	..	107
German Measles.....	858	1
Measles.....	24095	65
Mumps.....	7669	3
Paratyphoid Fever.....	5	..
Pneumonia.....	..	1818
Poliomyelitis.....	84	8
Scarlet Fever.....	7354	118
Septic Sore Throat.....	55	4
Smallpox.....	599	47
Syphilis.....	1331	..
Tetanus.....	..	8
Tuberculosis.....	1897	x972
Typhoid.....	833	76
Whooping Cough.....	2483	56
Goitre.....	145	16

xOnly 50% reported.

Communicable Diseases reported for the Province for Weeks Ending
December 6th, 13th, 20th, 27th, 1924

COMPARATIVE TABLE

Diseases	1924		1923	
	Cases-Deaths		Cases-Deaths	
Cerebro-spinal Meningitis.....	5	4	1	1
Chancroid.....	9	..
Chicken Pox.....	852	..	1087	..
Diphtheria.....	364	27	457	24
Encephalitis Lethargica.....	10	3	3	2
Gonorrhoea.....	119	..	168	..
German Measles.....	11	..	18	..
Influenza.....	..	13	..	9
Measles.....	1363	2	762	1
Mumps.....	582	..	306	1
Pneumonia.....	..	115	..	128
Poliomyelitis.....	6	1	2	1
Scarlet Fever.....	618	9	1060	18
Septic Sore Throat.....	5	..	17	2
Smallpox.....	33	..	51	..
Syphilis.....	95	..	167	..
Tuberculosis.....	123	64	166	85
Typhoid Fever.....	85	12	49	11
Whooping Cough.....	279	3	179	6
Goitre.....	44	3	5	3
Tetanus.....	..	2

The following municipalities reported cases of Small Pox:

West Lorne 1, Dunnville 1, Sherbrooke Tp. 2, Raleigh Tp. 4, Harwich Tp. 2, Whitney 1, Madawaska 3, Woodstock 1, Stratford 5, North Plantagenet 3, Sherwood Tp. 5, Leamington 4, Paris 1 death.

Notes on Current Literature

(From the Health Information Service, Canadian Red Cross Society,
410 Sherbourne St., Toronto)

Health Education

A programme for public schools and teacher training institutions, prepared by the Joint Committee of the National Education Association and the American Medical Association.

Public Education in Health

A memorandum by Sir George Newman, Chief Medical Officer of the British Ministry of Health.

School Games

A scheme for the teaching of health games to children waiting in clinics. "The Nation's Health," November, 1924, page 747.

Health Education in High Schools

An outline of a practical course in health education for high schools. "The Nation's Health," November, 1924, page 775.

Progress in Child Health

A report to the American Child Health Association, 1924. "Child Health Magazine," November, 1924, page 464.

Health Habits for School Children

By I. H. Goldberger. "Hygeia," November, 1924, page 705.

High School Lunch

Financial, administrative and educational policies in the provision of lunches to high school children. "Journal of Home Economics," November, 1924, page 625.

"Food, Teeth and Health"

A twelve-page folder published by the Philadelphia Child Health Society on the fundamentals of strong and healthy teeth.

Prevention of Blindness

A programme for the prevention of blindness. By L. H. Carris of the National Committee for the Prevention of Blindness. "The Nation's Health," November, 1924, page 773.

The Cinematograph in Education

The report of a committee set by the Imperial Education Conference.

News Notes

During 1924 a survey has been made of the whole province of Quebec by the District Inspectors of the Provincial Bureau of Health for the purpose of establishing the morbidity and mortality by tuberculosis and the Infant Mortality rate. In order to fight an enemy, its whereabouts, numbers and positions must first be defined and known. The results of this survey have been very satisfying.

The Province of Quebec now has, outside of Montreal and Quebec, eight Anti-Tuberculosis Clinics, all established on a uniform plan ensuring thereby a most successful unity of direction. The physicians and nurses in charge have all been previously trained for the work. The clinics are located at Chicoutimi, Rivière-du-Loup, Three Rivers, Thetford Mines, Arthabaska, Sherbrooke, Joliette and Valleyfield. Montreal will soon have two clinics, one under the direction of the Bruchési Institute and the other controlled by the Royal Edward Institute.

The Montreal Anti-Tuberculosis and General Health League are to be congratulated upon having secured the services of Dr. J. A. Baudouin to act as assistant to the managing director. It can be readily appreciated how the work of the Health League will benefit. Dr. Baudouin will, in addition to his duties with the League, carry on his University work and be in charge of the School for Public Health Nurses which the University of Montreal is opening. The Health League is co-operating in this by providing the demonstration health centre for the school. Dr. Baudouin thus has an excellent opportunity for demonstrating and teaching.

A definite step forward in Public Health work in the Province of Quebec has been made by the establishment of a school for Public Health Nurses by the University of Montreal. Trained workers will as a result be available in future.

This school has been made possible by the joint efforts and contributions of the University of Montreal, Province of Quebec, City of Montreal, Montreal Anti-Tuberculosis and General Health League and the Metropolitan Life Insurance Co.

The Montreal Anti-Tuberculosis and General Health League have recently completed a survey of the health conditions and the school med-

ical inspection services of the schools of the Montreal Protestant Board of School Commissioners.

The survey was made upon the request of the School Board who desire a better service than the Health Department is able to give them with their limited budget.

The out-door clinic of the University of Alberta Hospital has been moved from Edmonton South and established in a more central situation. The clinic quarters are most completely equipped and regular clinics are held under the direction of the chiefs of the following departments:

Medical.

Surgical.

Orthopedics.

Dermatology and Syphilology.

Pediatrics.

Gynecology and Obstetrics.

Eye, Ear, Nose and Throat.

Urology.

The staff includes a paid full-time Social Service worker.

The annual meeting of the Canadian Public Health Association will be held in the City of Montreal on June 29th, 30th and July 1st, 1925.

A Social Hygiene Exhibit is being shown in Sarnia under the auspices of the Canadian Social Hygiene Council and the Provincial Board of Health of Ontario. This exhibit is being shown in conjunction with the Health Week which is being demonstrated by the Board of Health. A further report on the Health Week will be published in the next number.

Editorial

SCARLET FEVER

In the present number of the JOURNAL the recent important advances in our knowledge of scarlet fever are carefully and concisely summarized. The very greatest significance attaches to the work dealt with in these articles. It seems to be firmly established as a result of the work of the Dicks, Dochez and others that the question of the etiology of scarlet fever is finally settled. A strain of hemolytic streptococcus has been shown to be the causative agent. This streptococcus is identifiable by its characteristic ability to produce a soluble toxin. This toxin can be neutralized by the serum of convalescent scarlet fever patients or by specific immune serum from horses immunized against it.

A new and valuable skin test to determine immunity or susceptibility to scarlet fever had been proposed by the Dicks of the Memorial Institute for Infectious Diseases, Chicago. This intra-cutaneous test is carried out in a manner similar to the Schick reaction and is known as the Dick test. Its very great value as an aid in diagnosis has been thoroughly established.

A further step of great importance has also been taken. The active immunization of susceptibles with toxin is being undertaken and passive immunization by injection of the specific serum is a procedure which is definitely indicated under certain circumstances. Thus scarlet fever contacts can apparently be protected as can diphtheria contacts.

Finally specific scarlet fever antitoxin is now available for the treatment of cases of the disease. Under these circumstances there should be not only a lessening of the mortality from, but also a diminution in the disabilities arising out of scarlet fever. These advances are as important as any which have been made in the field of communicable diseases during the past decade.

J. G. F.

